Review on Data Mining and Data Analysis Method for Adolescent Suicide Problem

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Abstract. This paper suggested that both positive and negative family factors can impact adolescent suicide rates. Supportive relationships with parents, siblings, and other family members can provide a sense of belonging, connection, and emotional support that can help to protect adolescents from suicidal thoughts and behaviors. Studies have found that adolescents who are exposed to these types of adverse family experiences are more likely to experience depression, anxiety, and other mental health problems, which can increase their risk of suicide. The research presented in this article suggests that family environment continues to be one of the most important factors influencing adolescent suicide rates, with the two groups most at risk for suicide having much higher levels of exposure to domestic violence and substance abuse. No significant changes were found in age, academic achievement, race, or family structure. This suggests that the most influential determinants of adolescent suicide rates are family environment, followed by gender and prior exposure to suicide. The purpose of this literature review on adolescent suicide is to provide a comprehensive overview of existing research on the influence of relationships and family on adolescent suicide rates, highlight key findings and identify areas for further research.

Keywords: Data Analysis; Adolescent Suicide; Data Mining.

1. Introduction

Suicide is a serious and significant public health concern that has garnered attention for many years. It is particularly prevalent among adolescents, a population that is especially vulnerable to suicidal behavior. Adolescence is a time of significant change and development, and it can be a difficult and challenging period for many young people. A range of risk factors may contribute to an adolescent's risk of suicide, including family dynamics, social pressures, and mental or personality disorders. Adolescent suicide rates continue to be a significant public health concern, with rates of suicide attempts and completed suicides increasing in recent years. The role of relationships and family in influencing suicide risk among adolescents is complex and multifaceted. A positive family environment, characterized by open communication, warmth, and positive conflict resolution, can also help adolescents to feel valued and supported, and may reduce the risk of suicide. On the other hand, negative relationships and family dynamics, such as high levels of conflict, abuse, neglect, or domestic violence, the potential for suicide to occur among adolescents may be exacerbated.

In order to effectively intervene and prevent adolescent suicide, it is essential that we identify and predict which adolescents are at the highest risk. Research has focused on improving our understanding of the risk factors that contribute to suicidal behavior in adolescents, with the goal of developing targeted and effective prevention and intervention strategies. Many suicide prevention efforts have focused on improving the recognition, intervention, and prevention of suicide and suicidal behavior, with the aim of reducing the incidence of suicide in this vulnerable population.

The importance of suicide prevention cannot be overstated. Suicide is among the top ten causes of death in the United States, and each suicide or attempted suicide represents the ongoing struggles of these individuals. [1] By understanding the risk factors for adolescent suicide, we can better predict and prevent future suicides, ultimately saving lives and improving the well-being of young people.

2. Data

The study included students between 14-19, with a mean age of 16 years. Out of the participants, 53% identified as male. The group was composed of 59% minority races, including a 22% Hispanic/Latino population, 18% of the population is African American, 12% of the population is Asian/Pacific Islander, approximately 5% of the population identifies as being of American Indian or Alaska Native ethnicity, and a further 2% identify as being of multiple racial backgrounds. 39% of the subjects were currently in a situation where they were living in a household with two parents, 34% of respondents live with only one parent, while 16% reside with their biological parent and stepparent. The other 11% of the group resides with their grandparents, other family members, or live on their own.[2] There were listed groups that studied: high; medium; low; no risk, and they were studied in order to see how variations in gender, age, grade, ethnicity, and family structure may have affected them. No significant differences in these factors were identified, except for the gender. In particular, the group of people who were at risk for suicide had a higher percentage of females, while the group that was not at risk for suicide had a higher percentage of males. Suicidal behaviors and depression were significantly higher in females than males within the suicide risk group. This was also found to be true when comparing males and females within the non-suicide risk group. The World Mental Health Survey, conducted by the World Health Organization from 2001-2007[3], gathered data from 108,705 participants through research, a correlation was found between a country's income level and the suicide rates of middle-aged and older males. Also, higher income countries also had higher rates of adolescents who had attempted suicide or had suicidal thoughts. In an article written by [4] Brezo et al in 2007 on the natural history of suicidal behavior in young adults in a population-based sample, A group of individuals from ages 6 to early adulthood, chosen to represent a school-aged population, was included in the sample (n=3017, n=1715, n=1684 respectively) [5]. Suicide accounted for roughly 0.2% of deaths, with nearly a third of individuals surveyed disclosing that they had entertained suicidal thoughts and close to 10% having attempted suicide at least once, according to the findings. Of those who reported attempting suicide, 4.9% first tried to do so before turning 18 years old. Females were found to have higher rates of non-lethal suicidal actions in this research on the frequency of suicidal thoughts and actions among 6-to-20-year-old in a specific area. We used two models, known as the dimensional and categorical models, to gather data. According to our research, cross-sectional studies and parental reports that there is a higher incidence of self-harm and suicide attempts among young people than previously thought.[6] The suicide attempts and the age of onset had a particularly clear relationship when examined through the lens of the dimensional model. In addition, we found that interpersonal relationships, in addition to income status, have a significant impact on suicide rates in adolescents. To improve our knowledge of why suicide occurs, we propose the Interpersonal Theory of Suicide. This theory proposes that the most lethal forms of suicidal thoughts are caused by a combination of feeling isolated and feeling like a burden to others, and that the ability to commit suicide is separate from the desire to do so. Research on suicide involves the fields of sociology, psychology, and anthropology.

3. Methods

3.1 Prediction Method: Family Factors are Used to Predict and Prevent Suicidal Behavior and Thoughts.

Investigation of the connection between suicide risk status and both perceived family risk and protective factors was carried out through ordered logistic regression in LIMDEP. Through this investigation, we were able to identify the unique influences of certain family elements while regulating for the influences of other factors, including demographic characteristics such as age, gender, ethnicity, and family structure by Randell et al 2006[1]. Suicidal behavior had a higher likelihood with greater degrees of conflict, depression, and substance abuse within the family, as revealed by the regression results. In contrast, a lower risk of suicide was correlated with greater

school support, assistance with depression and suicidal thoughts, and overall satisfaction with support. The regression showed that there was a significant connection between age, gender, and risk. As age increased, so did risk, with females being at a higher risk. Evidence points to the necessity of creating and examining indicated prevention programs targeting both adolescents and their guardians. Past investigations have shown that short, school-centered suicide prevention efforts can be helpful for at-risk high school dropouts, but there is a deficiency of research on the results of programs for parents and young people at risk for suicidal behavior. [7]

3.2 Analysis Method

Table 1. Literature Summary

Author	Data Type	Data source	Pre-processing	Testing Method	Results
Randell et al. [2]	experimental	During 14 to 19 years old, The mean age among the participants was 16 years old, with 53% of the sample being male. In terms of ethnicity, 59% of the group consisted of minority individuals. including Hispanic o Latino: 22% , African American: 18% , Asian or Pacific Islander:12% American Indian or Alaska Native: 5% , and other mixed ethnic backgrounds: 2% [2]	Data Classification	two-stage cross sectional survey design. [2]	Females reported a higher risk of suicide F (1, 1073) = 17.4 ($p < .001$). The group with the highest suicide risk differed significantly in terms of suicide exposure from the low-risk and no-risk groups.[2]
David Shaffer, Prudence Fisher [5]	observational	A volume of unpublished mortality statistics from 1978 titled "Vital Statistics of the United States" produced by the National Center for Health Statistics can be found, along with current population reports from the U.S. Bureau of the Census in Series P.25 No. 870. [5]	Feature extraction and selection	population-based statistics to examine (1) the frequency of suicide among children and adolescents; (2) which types of children commit suicide; and (3) whether there is or has been	Suicide rates may change due to external factors or changes in reporting procedures. External factors could be increased stress or changes in access to lethal means or treatment techniques. [13]
Gvion Y, Apter A. [7]	observational	An analysis published in the journal PLoS One by R. Carroll, C. Metcalfe, and D. Gunnell sought to investigate the occurrence of self-harm and the potential for both fatal and non-fatal repetition among hospital patients through a systematic review and meta-analysis. The publication, titled "Hospital presenting self-harm and risk of fatal and non-fatal repetition," appeared in volume 9, issue e89944. [7]	cleaning	Contemporary models of suicide risk	Diverse and complex suicidal actions and their treatments make it challenging to devise a universal model for evaluating suicidal risk or to propose a definite treatment plan.[7]
Brezo J et al. [4]	simulation	Experimental data	experimental	A school cohort comprising of members from a representative population was prospectively studied, with a total of 3017 participants at age 6, followed through mid-adolescence with 1715 participants, and finally to their early twenties with 1684 participants. Outcome measures included suicidal ideation, attempts, and completions.	About 1 in 500 people die by suicide. Approximately 33% have had suicidal thoughts and 9.3% have attempted suicide at least once. Over half of those who reported attempting suicide (4.9%) made their first attempt before age 18. Female non-fatal suicidal behavior is more common than male. [4]
Borges, G et, al. [8]	observational	Suicide attempts in the World Health	feature extraction and selection	The probability of a 12-month suicide attempt	The creation of risk indices through the combination of

		Organization's World Mental Health Surveys have been studied over the course of a year to determine the prevalence and identify risk factors.		can be accurately determined through the utilization of risk indices, which incorporate various risk factors from various domains. This has been demonstrated through the observation of high area under the receiver operating characteristic curve values ranging from 0.74 to 0.80 in both developed and developing nations. [8]	various risk factors across multiple domains has demonstrated the ability to accurately forecast In both developed and developing nations, there were 12-month suicide attempts with a calculated region beneath the receiver operating characteristic curve ranging from 0.74 to 0.80. [8]
Van Orden et al. [9]	observational	Why do people commit suicide? T. Joiner investigates this question in his book published by Harvard University Press in Cambridge, Massachusetts, US in 2005. [9]	feature extraction and selection	The Interpersonal Theory of Suicide's assumptions.	Suicidal ideation, which can be highly dangerous, is often the result of a combination of loneliness and overwhelming emotions. It is important to note that the ability to carry out suicidal thoughts is distinct from the desire to do so.
Bertolote JM et al. [6]	observational	A multi-site investigation by WHO on suicidal behaviors called SUPRE-MISS.	instance selection	The study's intervention component was conducted in the emergency department's catchment area, where it aimed to randomly interview at least 500 subjects from the general population living in each site.	The proportions of suicide attempts, plans, and thoughts varied significantly depending on the location. The percentage of suicide attempts that received medical attention ranged from 22% to 88%.[6]
Prinstein MJ. [10]	observational	In 2005, the Centers for Disease Control and Prevention was established.	feature extraction and selection	Examinations that are guided by theory and examine supposed risk factors offer significant progress. These examinations offer information on the frequency and characteristics of self-injury in the sample, in regards to developmental level, socioeconomic status, and ethnicity.	According to the findings, four groups of adolescents in a particular community may have engaged in self-harm. It appears that two of these groups may have engaged in this behavior occasionally, possibly for experimentation. [10]
Baechler, J., Aron, R., Aron, R., Polito Logue, S., & Aron, R. [11]	/	/	/	/	/
MAURI J. MARTTUNEN, M.D. et al. [12]	experimental	To collect data, we conducted interviews with the parents of the victims and healthcare professionals and examined official records. [12]	cleaning	To collect data, we conducted interviews with the parents of the victims and healthcare professionals, and examined official records. [12]	Suicide among individuals with less supportive parents was more likely to be motivated by social isolation and to be accompanied by a higher number of stressors in the final month, as well as more intense stress in the year preceding the act. These factors were more prevalent in this group compared to those who died by suicide with different parent support.

Six factors, previously determined to be predictors of suicide attempts, were examined by the sociodemographic module: age, gender, education level, household income, marital status, and employment.[2] This method has shown a strong correlation between its results and several family factors, The empirical research has consistently demonstrated that the experience of conflict with one's parents, the failure to achieve desired familial goals, and the presence of family depression can all contribute to an individual's own feelings of depression and suicidal ideation. On the other hand, the receipt of supportive behaviors and the sense of being supported by one's family have been found to mitigate such negative psychological states, were all included. Moreover, young people in the high

and moderate risk categories for suicide also stated that they experienced greater degrees of perceived domestic violence, substance abuse within the family, and family stressors. All these elements support the validity of predictions made using this method.

4. Discussion

There are pros and cons to consider regarding the experiment. One benefit is that it utilized a diverse and large sample of potential high school dropouts. It also employed reliable and effective measures to assess suicide risk. Although the sample size is large and representative of the at-risk youth group, it cannot be generalized to all youth.[11] Additionally, the data reported here are self-reports from the adolescents rather than actual observations. Even though they may not be the most reliable source, individuals who are involved in the study are still the primary source of information regarding their personal states and experiences. It is worth noting that this can be a limitation when analyzing the results. Despite certain restrictions, the study still provides significant understanding into the link between family risk and protective factors and the probability of suicide among vulnerable adolescents.

It is also worth noting that previous research has demonstrated several additional findings that are relevant to the present discussion, it was evident that the two groups most prone to suicide had considerably higher levels of exposure to domestic violence and substance abuse. No significant variations were detected in terms of age, academic grade, ethnicity, or family structure. This suggests that the most influential factor in determining suicide rates among adolescents is the family environment, followed by gender and previous exposure to suicide.

In order to further the progress of this experiment, it may be helpful to consider incorporating other theoretical frameworks in our analysis. One such theory that has been utilized to understand the prevalence of suicidal behavior is an interpersonal theory, which posits that the presence of three specific conditions can lead to a potentially lethal suicide attempt. However, it has been noted by [10] that interpersonal theories tend to focus on the development of certain competencies and the accumulation of perceived burdens, which may not vide sufficient precision in predicting suicidal behavior. Therefore, it may be worthwhile for future research to examine the relationships between interpersonal theory, family environment, risk, and violence, and to consider personal traits, social status, and interpersonal-related scales in the data collection and analysis methods. By examining all possible elements that could contribute to suicidal behavior, we may gain a more all-encompassing comprehension.

5. Conclusion

Further investigation is necessary to determine the progression of suicide from thoughts to plans and attempts, as well as the link between interpersonal and family relationships, needs to be strengthened, in addition personal traits belong to a part that cannot be ignored, which is especially important for predicting and preventing suicidal behavior and generating suicidal awareness. It is also certain that the family environment is still one of the most influential factors in the suicide rate among adolescents, even in a cross-cultural setting, and requires attention from the relevant health authorities as well as the government to focus on the family education and upbringing of children and adolescents and to shape good interpersonal relationships.

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